

*Hawley's  
Condensed Chemical  
Dictionary*

**ELEVENTH EDITION**

*Revised by*

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and  
**Richard J. Lewis, Sr.**

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EXHIBIT 1

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Organic Chemistry at Harvard in 1930 after teaching for several years at Bryn Mawr. He achieved the synthesis of vitamin K<sub>1</sub> and did fundamental research on cortisone, the chemistry of steroids and aromatic carcinogens. His achievements as a chemist and educator were recognized throughout the world. Unique in his facility in laboratory demonstration and as a lecturer and author, he exemplified that rare combination of a great teacher and a profound scholar.

**filament.** A continuous fiber usually made by extrusion from a spinneret (nylon, rayon, glass, polyethylene). It also may be a drawn metal (tungsten, gold) or a metal carbide.

See fiber.

**filament winding.** The process of winding fibers under tension on to a prepared core. Before or during the winding operation, the assembly is impregnated with a thermosetting resin. Structures of considerable size and strength can be made in this way. The fibers used are chiefly glass, boron, or silicon carbide.

See filament.

**filler.** (1) An inert mineral powder of rather high specific gravity (2.00-4.50) used in plastic products and rubber mix to provide a certain degree of stiffness and hardness and to decrease cost. Examples are calcium carbonate (whiting), barites, blanc fixe, silicates, glass spheres and bubbles, slate flour, soft clays, etc. Fillers have neither reinforcing nor coloring properties, and the term should not be applied to materials that do, i.e., reinforcing agents or pigments. Fillers are similar to extenders and diluents in their cost-reducing function; exact lines of distinction between these terms are difficult, if not impossible, to draw. Use of fillers and extenders in plastics has increased in recent years due to shortages of basic materials.

(2) The cross or transverse thread in a fabric or other textile structure.

(3) A metal or alloy used in brazing and soldering to effect union of the metals being joined. See also diluent, extender, reinforcing agent.

**film.** An extremely thin continuous sheet of a substance which may or may not be in contact with a substrate. There is no precise upper limit of thickness, but a reasonable assumption is 0.010 inch. The protective value of any film depends on its being 100% continuous, i.e., without holes or cracks, since it must form an efficient barrier to molecules of atmospheric water vapor, oxygen, etc. A long-chain fatty acid or alcohol on water produces a film whose "thickness" is the length of one molecule (approximately 200 Å). The fatty

acid molecules are oriented with the radical end in the water. Such films are good evaporation barriers and have been successfully imposed on glass. Sosp bubbles are elastic films about one micron thick and have considerable strength.

Film-forming agents (drying oils) are essential in paints and lacquers. Oxide films formed automatically on the surface of aluminum protect it from corrosion. Thin metallic oxide films are widely used in electronic and semiconducting devices. Electro-deposited metals (chromium, copper, nickel) are conventionally (and perhaps logically) called coatings.

The term film is also applied to sheets of cellophane, polyethylene, polyvinylidene chloride, etc., used for wrapping and packaging of food products, meats, and poultry (especially shrink films which are stretched before application). These function as a moisture vapor barrier. Plastic films are also used as slip surfaces in concrete structures such as air strips, ice rinks, and highways. Photographic film is made from cellulose acetate.

**filter.** See filtration; leaf, filter; baghouse.

**filter aid.** See filter media, filtration.

**filter alum.** See aluminum sulfate.

**filter media.** Almost any water-insoluble porous material having a reasonable degree of rigidity can serve as a filter. Sand is used in simple large-scale water filtration, the voids between the grains providing the porosity. In industrial operations, cotton duck, woven wire cloth, nylon cloth, and glass cloth are used. For laboratory work, Whatman filter paper, diatomaceous earth, and closely packed glass fibers are standard materials. Plastic membranes containing over a million pores per square inch are used in bacteriological filtration.

See also filtration, screen.

**filter sand.** Sand used to separate sediment and suspended matter from water.

"Filtrasorb Carbon,"<sup>TM</sup> TM for specially engineered activated carbon granules having mechanical strength great enough to withstand repeated filter backwashings and regeneration at high temp.

Use: In conjunction with polymeric water treatment chemicals for coagulating solids in raw sewage with subsequent filtration over the carbon granules.

**filtration.** The operation of separating suspended solids from a liquid (or gas) by forcing the mix-